

REMARKS

Claims 1-22 are all the claims pending in the application. New claims 23-32 are added, as indicated herein.

§ 102(e) Rejections (Ohta) – Claims 9, 10, 13, 16, 17, and 20

Claims 9, 10, 13, 16, 17, and 20 are rejected under 35 U.S.C. § 102(e) as being anticipated by Ohta et al. (U.S. Patent No. 5,737,105), hereinafter referred to as Ohta.

Applicant amends independent claims 9 and 16, as indicated herein, and submits that Ohta does not teach or suggest at least “widening the spectrum of a signal in at least one transmission direction by modulating a wavelength of the signal,” as recited in independent claim 9 and similarly recited in independent claim 16. That is, Ohta does not disclose that widening is accomplished by modulating the wavelength of an emitted signal. As shown in Ohta (Fig. 8), a modulator 73 is provided downstream of laser 72. The purpose of this modulator is to modulate an optical carrier (col. 9, lines 28-29 of Ohta) to transfer on said carrier the information provided by transmission multiplexer 71. The signal output by the modulator is the usual data transmitted via the optical fiber. That is, the signal output by the modulator corresponds to the “signal” recited in the quotation above. In the present invention, the spectrum of the “signal” is widened by modulating a wavelength of this “signal.” *See present application, page 7, lines 12-13.* Clearly, the claimed modulation is different from the modulation performed by the modulator 73 of Ohta, as the claimed modulation occurs after the signal would have been output from modulator 73. This point is further supported by the fact that the specification, at page 7,

lines 15-16, states that the modulation rate is typically greater than a few times the bit rate of the link, which indicates that an additional modulation occurs that is different from the modulation that is conventionally (Ohta) used to transfer the information to be transmitted on the optical carrier. Nowhere does Ohta teach or suggest further modulation of a wavelength of the signal output from the modulator 73. Therefore, for at least these reasons, Applicant submits that independent claims 9 and 16 are patentably distinguishable over Ohta.

Claims 10, 13, 17, and 20 are patentable at least by virtue of their respective dependencies.

§ 102(b) Rejections (Spencer) – Claims 1, 2, 5, and 6

Claims 1, 2, 5 and 6 are rejected under 35 U.S.C. § 102(b) as being anticipated by Spencer, International publication no. WO 97/23965, for the reasons set forth in the Office Action. *See numbered paragraph 2.*

With respect to claims 1 and 5, Applicant amends these claims to depend from independent claims 9 and 16, respectively. Applicant submits that claims 1 and 5 are patentable at least by virtue of their respective dependencies from independent claims 9 and 16.

Further, with respect to claims 1 and 5, Applicant submits that Spencer does not teach or suggest “wherein wavelengths for data signals propagating on inbound lines are different from data signals propagating on outbound lines,” as recited in amended claims 1 and 5. To anticipate Applicant’s invention, the applied reference must disclose each and every limitation of the claimed invention. Here, the applied reference, Spencer, only teaches that the line traffic signal

(i.e., data signal propagating on an outbound fiber 12) and the OTDR probe signal, which propagates in the same direction as the line traffic signal, are required to be of different wavelengths. The reason for this requirement is that Spencer needs to filter out the backscattered line traffic signal (filter 36 on Fig. 1; Bragg filter 40 on Fig. 2) to prevent backscattered signals from being present on the inbound line 14 and adversely interacting with the return traffic signal propagating on the inbound fiber 14.

Spencer, however, does not teach or suggest that the wavelengths for data signals propagating on inbound lines are different from data signals propagating on outbound lines, as required by claim 1.

Furthermore, the arrangement proposed by Spencer has a drawback which is avoided by Applicant's claimed invention. That is, in Spencer, two filters (one for each direction of propagation) must be provided in each optical repeater because a fiber break 34 may occur anywhere on the line. This arrangement is costly. On the other hand, the present invention, as recited in independent claims 1 and 5, provides a solution whereby interaction between backscattered upstream signals and downstream signals on a downstream fiber is avoided.

Finally, at least one advantage of the present invention is that it is no longer necessary to have two filters in each optical repeater, but a single filter is all that is needed in each receiver.

See page 6, lines 21-24 of present application.

With respect to claims 2 and 6, Applicant submits that these claims are patentable at least by virtue of their dependency.

§ 103(a) Rejections (Gautheron / Horuichi) – Claims 1 and 5

Claims 1 and 5 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Gautheron O. et al., IEEE photonics technology letters, vol. 9, no. 7, July 1997, in view of Horuichi et al. (U.S. Patent No. 5,790,294), hereinafter referred to as Horuichi. To support these rejections, the Examiner states that Gautheron teaches all of the limitations of Applicant's invention, as recited in claims 1 and 5, except that Gautheron does not disclose different wavelengths in the two different transmission directions. The Examiner alleges, however, that Horuichi makes up for the deficiencies of Gautheron.

With respect to claims 1 and 5, as indicated above, Applicant amends these claims to depend from independent claims 9 and 16, respectively, and submits that neither Gautheron nor Horuichi, either alone or in combination, teaches or suggests all of the limitations of claims 1 and 5.

Further, to support an obviousness rejection, there must be some teaching, suggestion, or motivation to combine the references used to support such a rejection. *See In re Mills, 916 F.2d 680, 16 U.S.P.Q.2D 1430 (Fed. Cir. 1990)*. Here, there is no such teaching, suggestion, or motivation to combine Gautheron and Horuichi. Gautheron only discusses COTDR performance optimization for amplified transmission systems “when data is launched in both directions at the same wavelength.” *See Abstract and conclusion*. Horuichi, as the Examiner alleges, teaches monitoring of an optical transmission system which has a different wavelength in the two transmission directions. Clearly, there is no teaching, motivation, or suggestion to combine

Horuichi, which allegedly teaches monitoring of an optical transmission system which has a different wavelength in the two transmission directions, with Gautheron which is only directed to a transmission system having the same wavelength in both directions. Therefore, for at least these reasons, claims 1 and 5 are patentable over Gautheron in view of Horuichi.

§ 103(a) Rejections (Spencer / Ohta) – Claims 4 and 8

Claims 4 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Spencer in view of Ohta.

In response, Applicant submits that claims 4 and 8 are patentable at least for the same reasons set forth above with respect to the § 102(b) rejections of claims 1 and 5, from which claims 4 and 8 depend. Ohta does not make up for the deficiencies of Spencer.

§ 103(a) Rejections (Spencer / Fleuren) – Claims 3 and 7

Claims 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spencer in view of Fleuren (U.S. Patent No. 5,570,217). To support the rejections of these claims, the Examiner states that Spencer discloses all of the limitations of Applicant's invention, as recited in claims 3 and 7, except that Spencer does not teach that "the wavelengths in the two transmission directions are chosen so that the backscattered signal originating from the signal in one transmission direction is attenuated by a factor of at least 10 on passing through the receive filter of a channel in the other transmission direction." The Examiner alleges that Fleuren makes up for the deficiencies of Spencer.

In response, Applicant submits that, contrary to the Examiner's assertions, Spencer does not teach or suggest the limitations of claims 1 and 5, from which claims 3 and 7 depend, respectively, as argued in the section above discussing the § 102 (b) rejections of claims 1 and 5. Therefore, claims 3-7 are patentable at least by virtue of their dependency. Fleuren clearly does not make up for the deficiencies of Spencer, and neither Spencer nor Fleuren, either alone or in combination, teaches or suggests all of the limitations of claims 3 and 7, including the limitations of the claims from which they depend.

§ 103(a) Rejections (Ohta / Wong) – Claims 11 and 18

Claims 11 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohta in view of Wong et al. (U.S. Patent No. 5,062,703), hereinafter referred to as Wong. To support this rejection, the Examiner states that Ohta discloses all of the limitations of Applicant's invention, as recited in claims 11 and 18, except for the limitation "the wavelength modulation means effect wavelength modulation with a modulation rate in the range from 0.5 kHz to 10 GHz," as recited in claim 11 and similarly recited in claim 18. The Examiner alleges that Wong makes up for the deficiencies of Ohta.

In response, first, Applicant submits that Ohta does not teach or suggest all of the limitations of Applicant's invention, as set forth above with respect to independent claims 9 and 16, from which claims 11 and 18 depend.

Second, Applicant submits that one skilled in the art at the time the invention was made would not have combined Wong with Ohta in order to obtain a good transmission, as the

Examiner states. Wong specifically teaches away from using the OTDR technique to determine breaks in optical transmission systems. *See Wong, col. 1, line 52 - col. 2, line 37.* That is, Wong employs a modulation frequency domain technique, as opposed to the COTDR technique of Applicant's invention, and Wong discloses that such a modulation frequency domain technique has several advantages over implementing COTDR. Wong only mentions time or distance domain information, which Applicant admits may relate to COTDR, with respect to computing such information based on the modulation frequency domain information obtained through the Wong invention. *See col. 3, lines 12-28.* That is, Wong does not actually implement COTDR to obtain such time or distance domain information, Wong merely converts modulation frequency domain information into such time or distance domain information. Therefore, for at least the above-stated reasons, Applicant submits that claims 11 and 18 are patentably distinguishable over the applied references.

§ 103(a) Rejections (Ohta / Eskildsen) – Claims 12, 14, 15, 19, 21, and 22

Claims 12, 14, 15, 19, 21, and 22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ohta in view of Eskildsen et al. (U.S. Patent No. 5,959,750), hereinafter referred to as Eskildsen. The Examiner rejects these claims for the reasons set forth in the Office Action.

In response, Applicant submits that Ohta does not teach or suggest all of the limitations of Applicant's invention, as set forth above with respect to independent claims 9 and 16, from

which claims 12, 14, 15, 19, 21, and 22 depend. Eskildsen clearly does not make up for the deficiencies of Ohta.

Finally, claims 11, 12, 15, 18, and 19 have been amended, as indicated herein, for clarification purposes and to broaden their scope. Applicant adds new claims 23-28, as indicated herein, to reflect the limitations removed from claims 11, 12, 15, 18, and 19, respectively. Claims 3 and 7 have also been amended, as indicated herein, for clarification purposes. Also, new claims 29-32, which correspond to claim 1, 5, 9, and 16, respectively, have been added. New claims 23-28 are patentable at least by virtue of their dependencies. New claims 29-32 are patentable at least because the applied references do not teach or suggest each and every limitation of these claims, respectively.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

Amendment Under 37 C.F.R. § 1.111
U.S. APPLN. NO. 09/297,382

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee, except for the Issue Fee, for such extension is to be charged to Deposit Account No. 19-4880.

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APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

The claims are amended as follows.

1. (Amended) ~~An~~ The ~~amplified and non-bi-directional fiber optic link including optical loopback (18, 19, 21) of the amplifiers (13, 14; 15, 16) to enable COTDR according to claim 9,~~
~~characterized by wherein wavelengths for data signals propagating on inbound lines are different~~
~~from data signals propagating on outbound lines different wavelengths in the two transmission~~
~~directions.~~

3. (Twice Amended) ~~A~~ The ~~link according to claim 1, characterized in that wherein the~~
~~wavelengths in the two transmission directions are chosen so that the backscattered signal~~
~~originating from the signal in one transmission direction is attenuated by a factor of at least 10 on~~
~~passing through the~~ a ~~receive filter of a channel in the other transmission direction.~~

5. (Amended) ~~A~~ The ~~method of reducing interaction between the signal in one~~
~~transmission direction and backscattered noise originating from the other transmission direction~~
~~in an amplified and non-bi-directional fiber optic link including optical loopback (18, 19, 21) of~~
~~the amplifiers (13, 14; 15, 16) to enable COTDR according to claim 16, characterized by wherein~~
~~wavelengths for data signals propagating on inbound lines are different from data signals~~
~~propagating on outbound lines the use of different wavelengths in the two transmission~~
~~directions.~~

7. (Twice Amended) The method claimed in claim 5, ~~characterized in that~~wherein the wavelengths in the two transmission directions are chosen so that the backscattered signal originating from the signal in one transmission direction is attenuated by a factor of at least 10 on passing through ~~the~~a receive filter of a channel in the other transmission direction.

9. (Amended) An amplified and non-bi-directional fiber optic link including optical loopback ~~(18, 19, 21)~~ of the amplifiers ~~(13, 14; 15, 16)~~ to enable COTDR, ~~characterized by~~ comprising means for widening the spectrum of ~~the~~a signal in at least one transmission direction by modulating a wavelength of the signal.

11. (Amended) ~~A~~The link according to claim 10, ~~characterized in that~~wherein the wavelength modulation means effect wavelength modulation with a modulation rate in the range from 0.5 kHz to 10 GHz, ~~preferably in the range from 1 kHz to 5 GHz.~~

12. (Twice Amended) ~~A~~The link according to claim 10, ~~characterized in that~~wherein the wavelength modulation means vary the wavelength over a range greater than a few times the bit rate of the link, ~~preferably greater than twice the bit rate of the link.~~

15. (Amended) ~~A~~The link according to claim 14, ~~characterized in that~~wherein the phase modulation means effect modulation at a modulation rate greater than a few times the bit rate of the link, ~~preferably greater than twice the bit rate of the link.~~

16. (Amended) A method of reducing interaction between the signal in one transmission direction and backscattered noise originating from the other transmission direction in an amplified and non-bi-directional fiber optic link including optical loopback ~~(18, 19, 21)~~ of the

amplifiers ~~(13, 14, 15, 16)~~ to enable COTDR, ~~characterized by widening of wherein the a~~
spectrum of the signal in at least one transmission direction is widened by modulating a
wavelength of the signal.

18. (Amended) The method claimed in claim 17, wherein the modulation rate is in the
range from 0.5 kHz to 10 GHz, ~~preferably in the range from 1 kHz to 5 GHz.~~

19. (Twice Amended) ~~A~~ The method according to claim 16, ~~characterized in~~
~~that~~ wherein the wavelength modulation varies the wavelength over a range greater than a few
times the bit rate of the link, ~~preferably greater than twice the bit rate of the link.~~

22. (Amended) ~~A~~ The method according to claim 21, ~~characterized in that~~ wherein the
modulation rate is greater than a few times the bit rate of the link, ~~preferably greater than twice~~
~~the bit rate of the link.~~

Claims 23 - 32 are added as new claims.